

Functionalized Graphene Sheets-Polymer Based Nanocomposite for Cryotanks, Phase I

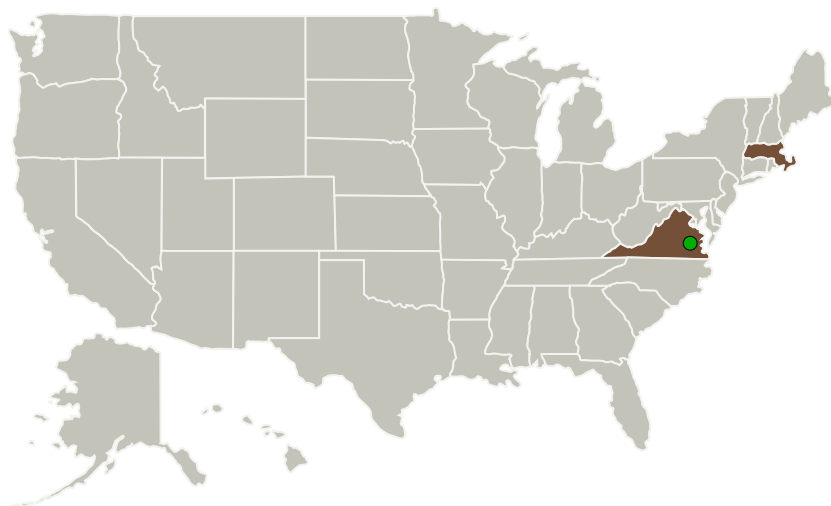
Completed Technology Project (2010 - 2010)



Project Introduction

NASA seeks advanced high strength and toughness composite materials with the highest microcrack resistance at cryogenic temperatures suitable for use in fuel containment of liquid oxygen, hydrogen, and methane. Nanotrons Corporation, in collaboration with Prof. Bungki Kim at NSF nanomanufacturing research center in University of Massachusetts Lowell, proposes to develop lightweight functionalized graphene sheets-polymer nanocomposite materials for advanced composite cryotanks. By uniformly dispersing high performance functionalized graphene sheets through novel polymer matrix the new lightweight nanocomposite will be fabricated and should exhibit significantly increase resin strength and modulus and reduce coefficient of thermal expansion of polymer resin. The resultant nanocomposite material can much increase the resistance to microcracking at cryogenic temperature in ways it has never done before. The new composite materials also provide additional advantages in forming an impermeable barrier to gas and liquid molecules ideal for fuel tanks. Nanotrons' proposed new multifunctional nanocomposite based carbon fiber reinforced polymer composite cryotanks will replace the currently used aluminum-lithium cryotanks providing significant weight savings and can be economically scaled-up for manufacturing. Phase I will demonstrate the feasibility of our approach.

Primary U.S. Work Locations and Key Partners



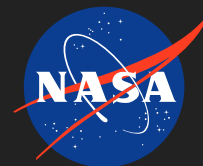
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Organizations Performing Work	Role	Type	Location
Nanotrons Technologies	Lead Organization	Industry	Woburn, Massachusetts
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Massachusetts	Virginia

Project Transitions

▶ **January 2010:** Project Start

✓ **July 2010:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140101>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Nanotrons Technologies

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

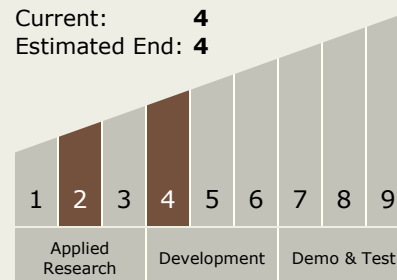
Carlos Torrez

Principal Investigator:

Je Kyun Lee

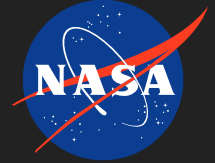
Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.1 Lightweight Structural Materials

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System